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THE TEETH
IN
HEALTH AND DISEASE

DAVIESON.

150. a. 6.

THE TEETH:

IN

HEALTH AND DISEASE.

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IN

HEALTH AND DISEASE.

BY

EDWARD DAVIESON,

Surgeon-Dentist.

LECTURER ON THE ANATOMY AND PHYSIOLOGY OF THE MOUTH.

"So it falls out,
That what we have, we prize not to the worth
While we enjoy it, but being lacked and lost,
Why then we rack the value; then we find
The virtue that possession could not shew us
Whilst it was ours."—SHAKESPEARE.

150. a. 6.

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PREFACE.

In the course of a very extensive practice as a Dental Surgeon, I have been frequently asked for a work written in a popular style, devoid of technicalities, treating on the teeth—which without being elaborated into a large volume, and, therefore, as far as the public is concerned unreadable, should yet contain as much information as possible upon the Anatomy, Physiology and Pathology of the teeth, together with a few practical hints as to their management. There was no such work. Books in abundance there are in which the whole matter is dealt with in a scientific manner, and adapted to professional readers. English medical literature is as rich as any in the world in books suited for professional reading; but in popular treatises on this and many other subjects very deficient. In the following pages my object has been to supply to some extent this desideratum. How perfectly I have done so I must leave my readers to judge.

I have introduced several discoveries of my own, because they are intimately connected with the subject under consideration, and are calculated, I think, to produce a great change in the Science and Art of Dentistry—that most or all of them will speedily become universally adopted I have no doubt. In the

meantime those who will receive the greatest benefit from them should not be ignorant of their existence.

I have not written as a theorist, but as a practical man, as one whose life has been spent in the practice of his profession, and whose observations have been extended to several countries besides his own, and who, therefore, has more claim to knowing what was required and the means of supplying the deficiency.

EDWARD DAVIESON.

448, *West Strand, London.*
(Adjoining the Electric Telegraph Office.)

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THE TEETH

IN

HEALTH AND DISEASE.

CHAPTER I.

INTRODUCTION.

"Tis the sublime of man,
Our noontide majesty to know ourselves,
Parts and proportions of a wondrous whole."

COLERIDGE.

Any branch of study which has for its object the making mankind better acquainted with their physical organization, cannot but be both interesting and important. Of all the subjects that the human mind is capable of dealing with, surely that should merit first attention which concerns either the wondrous faculties of that mind itself, or the material frame through which it acts, and by whose instrumentality, its greatest achievements receive a practical application. From the time that the old Greek moth Γνωθι Σεαυτον was inscribed upon the Temple of Delphos, down to the period that Pope gave birth to his memorable couplet

"Know then thyself, presume not God to scan,
The proper study of mankind is man;"

both poets and philosophers have attached the highest importance to the investigation of the wonders and mysteries of man himself. In the external universe there are no doubt ten thousand

beauties which have a charm and an irresistable fascination for every student of Nature, but in the smaller world of man, the subject receives additional interest from the fact that it is the agent employed in investigating the rest. Old George Herbert very wisely said

"Man is one world,
And hath another to attend him."

This is true, not perhaps in the sense of the microcosm of the Ancients, but in a manner equally high, and certainly not less instructive. The complicated nature of man's organization, the intricate workings of the individual parts which enter into its grand machinery, and the splendid adaptation of the whole, both to each other, and to the purpose to which they are applied, may be in truth said to make up a world of a most marvellous character.

That particular department of the great science of man which it is the object of these pages to describe, is one which has been, perhaps, more than any other, neglected. Scarcely any attention has been bestowed upon it, beyond that which it has received at the hands of those whose professional occupations necessitated some acquaintance with its details. The public, important as it is that they should know something of so conspicuous a portion of the human frame, and one, which becoming deranged, is so likely to lead to disease in other parts of the body, have, notwithstanding, never looked upon it as a matter at all essential to be made a subject of study.

When disease or pain has occasionally drawn attention to the teeth, in spite of any disinclination to do so, it has been but to prompt the seeking assistance from some one else, who, in all probability, was equally ignorant of the cause and nature of the derangement. This over, no more is thought of the functions performed by these important organs, and the circumstances likely to engender disease in them, until a repetition of the affection occurs, and most likely, with increased severity. It is

by no means contended, that it is essential that every one should thoroughly master all the intricate phenomena of dental anatomy and physiology, any more than it is expected that the same person should have a minute acquaintance with the structure and functions of the brain, the blood-vessels, or any other part of the body, but there can be no doubt whatever that a good stock of general information upon all these topics would be productive of a vast amount of benefit. Many a life might be spared, and many a disease averted, by a very moderate amount of knowledge of the human frame, being universally possessed, and scores of persons now with mouths *sans* teeth, might, had they possessed such meagre information as it is the object of these pages to impart, have now found all their dental organs in the most perfect state of preservation. To those who might have been desirous of obtaining information upon this important topic, hitherto, there has been an immense difficulty to surmount. All the really good books on the subject have been written in such a technical style, that few could understand them who had not received the advantage of a semi-medical education. My purpose is to remedy this state of things, and hence the following chapters, which are an attempt to explain in a popular style, everything of interest or importance in connexion with the teeth, so that the most ignorant may obtain instruction, and the most learned find nothing to object to. In addition to which, my own discoveries introduced will be found to have an interest for the profoundest man of science, and admit of an application intimately bound up with the well-being of all.

Not simply with the public has the ignorance of this important branch of physiological science rested. It is to be found exactly where it would be least of all expected, in the ranks of the Medical Faculty.

The men who, of all others, one would suppose should be the most perfectly acquainted with it, and in the exercise of whose

profession a thorough knowledge of the anatomy, physiology, and pathology of the teeth is indispensable to the successful treatment of a great number of their patients, are, in the majority of cases, as ill-informed upon this important subject, as the public who place themselves under their care.

An eminent surgeon-dentist, himself a medical man, and attached to a large Metropolitan Hospital, in a very able paper read before a Medical Society, and afterwards published, recently lamented over this want of attention on the part of the profession to the diseases of the teeth, in the following strains: "Considering the frequency, the severity, and the serious results, local and constitutional, of diseases of the teeth, it is always to me a source of great regret, that they are not more studied by medical men, the majority of whom frankly admit that they know nothing about them, and yet they are called upon to treat them. **** It is singular that this inattention, on the part of medical men, should apply to those diseases, which are almost universal, while complaints that are of comparatively rare occurrence are thoroughly studied. Perhaps it is to their very commonness and frequency that the neglect is partly owing, but no doubt it is in a still greater measure due to the supineness of our several examining bodies. If pupils were required to attend lectures on the teeth, as they are on the eye, or any other organ of the body—if they were examined or likely to be examined on the subject, they would take care to study and master it. At present it is shirked altogether, and although most of the hospital authorities have permitted a Course of Lectures to be given every Session on this head, a pupil told me the other day that only five attended them out of three hundred students, in one of the largest schools in London. The consequence is, that when young men get into practice on their own account, they find themselves in difficulty. Many have admitted to me that they could not distinguish between the temporary and permanent teeth, and how is it possible for us to understand the diseases of

any structure or organ, if we are unacquainted with it in its natural condition? For the credit of our profession, and for the sake of humanity, I have long laboured to remedy this state of things, and called upon the authorities in vain."*

This testimony, coming from a member of the Royal College of Surgeons, is certainly of a most startling character. Had it been written by any one else, it might have been thought dictated by prejudice; as it is, it is free from any such suspicion; the state of things that it points out is most deplorable, and one which should be seriously reflected upon.

Some effectual means should certainly be taken to extend information upon a branch of knowledge most interesting in itself, and most important in the practical application of which it is susceptible, that both the profession and the public might add to their stock of knowledge upon the structure, functions and diseases of the teeth.

* On some Severe Forms of Disease arising from the retention of decayed Teeth. By J. C. Clendon, M.R.C.S. London, Richards 1858.

CHAPTER II.

THE ANATOMY OF THE TEETH.

How were the human teeth so wisely wrought
How was their form to such perfection brought
What did their figures for their purpose fit;
Their numbers fix, and in their sockets knit,
And made them all in that just order stand—
Which action, ornament, and use demand.

The early anatomists always classed the teeth with the bones, and reckoned them as portions of the general skeleton; hence in all old books, they will be found, included in the number of bones which go to make up the osseous part of the human frame.

Afterwards, another theory was adopted, and they were looked upon as belonging to the cuticular tissues, such as the nails, hair, &c.

Recently, a minute examination of their structure by the aid of the microscope, has tended to revive to some extent the first opinion.

That they have much in common with the bones, there can be no kind of doubt; their chemical constituents are the same, differing only in the proportions in which they are combined, a point of no importance whatever, since the bones themselves differ in this respect at different ages. Their internal structure is precisely the same, a dissimilarity only being found in the case of the enamel. But on the other hand, their position in the body, and the circumstances connected with their growth and decay, appear to present little or no analogy to the bones. They

are not covered with soft parts, but exposed in a great part of their surface to contact with the air, which in the human being, happens with none of the other bony structures. In answer to this, however, it has been objected, that in some of the lower animals, true osseous tissues are so placed.

Then the first set is replaced by another, differing in the number of teeth which comprize it from its predecessor, and frequently the whole of them disappear from the system, long before death takes place—circumstances which certainly do not apply to the rest of the bones.

The purpose had in view in furnishing the human being with two sets of teeth, is to meet a particular contingency that arises in these organs, viz: their incapability of growth. Their structure is so hard and firm as to prevent those changes in size from taking place which are constantly occurring in the rest of the organs of the body from birth to manhood. The consequence of this would be, were it not remedied in some other way, that the infant must possess teeth of the same size as the adult, a very similar circumstance to what does occur in the bones of the internal ear, also intensely hard for the purpose of the better transmission of sound. In order to avoid this, in the case of the teeth—as such a condition would be both unsightly and inconvenient—the first set is thrown off between the ages of six and fourteen, and its place supplied by another of a more permanent character. Cases are on record in which three sets have appeared, but they are somewhat rare. The first set, as a rule, consists of twenty teeth, though not unfrequently the number is larger; and the last of thirty-two. The former are termed the temporary, deciduous, or milk teeth, and the latter is called the permanent set.

The teeth are composed of three distinct substances, arranged in various ways in different animals according to the purposes they have to serve. These are called the enamel, which, in man, covers all that portion of the tooth that is exposed to the air,

the dentine or what was formerly termed the ivory, and which comprises the bulk of the tooth, and the *Crusta petrosa* or *cementum*, which covers all that part of the tooth to which the enamel does not extend.

The *Enamel* is extremely smooth and polished on its surface, of a milk white colour, and so hard as to strike fire with steel. No blood vessels enter into it, and consequently, when it becomes rubbed off from the tooth, nature does not possess the power of replacing it. This is a fact of very great importance, and will be again referred to hereafter. It is thickest at the upper part of the tooth, and gradually becomes thinner towards the alveoli, where it altogether disappears. Like most substances of a similar kind, it may be artificially made to assume various colours.

The *Dentine* corresponds to the ivory in the tusk of the elephant, and comprises by far the greater portion of the bulk of the tooth. It is extremely hard, though less so than the enamel. The microscope has revealed in it a great number of minute tubes, the average diameter of which is not more than 1-10,000 of an inch, and which are supposed to correspond to what are termed the canaliculi of the bones. These tubes are too minute to admit blood vessels.

The *Crusta Petrosa* is of the same structure as the bone, and its purpose supposed to be to fix the teeth firmly in the sockets.

Each tooth consists, in anatomical language, of a crown or body, being the part which is exposed and covered with enamel, one or more fangs or roots, the parts entering into the sockets, and between these a slightly contracted portion called the cervix or neck which is surrounded by the gums. The fangs of the tooth are of a conical form, becoming gradually smaller as they proceed downwards, and by this means the pressure is removed from their extreme points to be equally distributed over their surface.

There is a small aperture at the extreme point of the root which leads into a canal that passes into the crown of the tooth. This cavity generally assumes the shape of the tooth, being largest in the body, and very small towards the opening where it commences. Where there are two fangs it passes down both. It contains a soft, pulpy substance, into which nerves and vessels pass, termed the pulp of the tooth.

The number of teeth in the second or permanent set, it has been already stated, is thirty-two, sixteen in each jaw, sometimes however, a smaller number is met with, which generally arises from the last one remaining concealed in the alveolus.

The absence of the lateral incisors has occasionally been met with, in which case the middle pair are generally very much enlarged, and thus occupy both their own space and that of the absent tooth. Borelli mentions a woman, seen by himself, who reached the age of sixty and never had any teeth. Instances of this kind are extremely rare. Occasionally the crowns of two or more teeth become blended in one. Soemmering had, in his museum, a specimen in which two were joined in this way, and Plutarch relates of Pyrrhus, King of Epirus, that the crowns of the whole of his were united. The same circumstance was observed, accordingly to Pliny, in the son of Prusias, King of Bithynia. Cases have occurred in which more than sixteen teeth have appeared in one jaw. Plouquet mentions that he himself had five incisors, but these instances are exceptional and very seldom seen.

The teeth are generally divided into incisors, canines and molars; recently, however, four of the latter in each jaw have been named bicuspids. This applies to the permanent set only, as there are no bicuspids among the temporary teeth, the eight molars of the deciduous set being replaced by the eight bicuspids. The following table shows the relative position occupied by the various teeth in both sets.

TEMPORARY TEETH

	Molars.	Canine.	Incisors.	Canine.	Molars.		
Upper jaw	2	1	4	1	2 = 10	}	=20
Lower jaw	2	1	4	1	2 = 10	}	

PERMANENT TEETH.

	Molars.	Bicuspids.	Canine.	Incisors.	Canine.	Bicuspids.	Molars		
Upper jaw	3	2	1	4	1	2	3=16	}	=32
Lower jaw	3	2	1	4	1	2	3=16	}	

A general but very brief description of each of these divisions may not be out of place.

I. *Incisors.* The incisors are eight in number, and are situated in the front of the mouth. Their name is derived from *incido,* to cut, and was given to them by Linnæus in consequence of their being employed in cutting or dividing the food; their crown is somewhat of a wedge shape, broad and thin towards the edge, and becoming thicker towards the root. They have but one fang. The incisors in the upper jaw are stronger and larger than the corresponding ones in the lower jaw. In the former, those placed in the middle are the largest; whilst in the latter the reverse is the case, the central incisors being the smallest of any. The incisors in the lower jaw are more vertically placed than the upper ones, which are directed obliquely forward, and therefore, the edges of the upper, project slightly over those of the lower, something like the blades of a pair of scissors.

II. *Canine teeth.* These were so named from their resemblance to the teeth of the dog, and their being employed for a similar purpose, that of tearing the food. They are now, however, more frequently called cuspides, from *cuspis,* a spear, there being a supposed resemblance in them to the point of that instrument; they are four in number, situated two in each jaw immediately next the incisors; their crown is of a conical form, convex in front, and hollowed out behind and terminating in a point. They are larger and stronger than the incisors. Like them, they

have but one root, but it is very much longer and thicker, indeed it is the longest fang possessed by any of the teeth, and frequently projects before the alveolus. The upper and lower canine teeth do not exactly meet; the latter being situated a little more forward; their summits, therefore, fall into the space between the upper canines and incisors. The canine teeth in the upper jaw exceed in length any of the others, and for that reason have been vulgarly called eye-teeth.

III. *Bicuspids.* These teeth, as has been already stated, comprise eight of what were at one time called molars, and are sometimes still designated small, false, or premolars. They are smaller than the canines, immediately adjacent to which, on the outside, they are placed; their roots are generally single, sometimes bifurcated, more especially in the upper jaw, but seldom entirely double; the upper are larger and approximate more nearly to the true molar than the lower.

IV. *Molars.* These have been sometimes termed *multicuspids,* more generally they are described as the large molars. Their principal characteristic is the large size of the crown and the extent of its upper surface for the purpose of grinding the food. Their name is derived from *mola,* a mill. The first is the largest and the last the smallest, so that a gradation may be observed in their size. Their roots are divided into two, three, four or even five branches, and are much shorter than those of the bicuspids. Their fangs differ very considerably in the direction they take, and in their degree of divergence. The crowns of the lower molars are longer than those of the upper. The last two molar teeth are generally called *dentes sapientiæ* or wisdom teeth, from the fact that they do not make their appearance till the age of puberty; their roots are generally consolidated so as to present in each tooth an irregular conical mass; sometimes, however, traces of a subdivision may be observed.

A curve is formed by the entire set of teeth in each jaw, called the dental arch, this is continued without any interruption

such as we meet with frequently in the lower animals. The upper dental arch is slightly the largest, which is the reason that it overlaps the other. Both terminate, however, at the same point, in consequence of the large size of the front incisors in the upper jaw. The crowns of the whole of the teeth are remarkable in man for their evenness in height. There is a difference, but it is very slight and gradual, the front incisors being the highest and the wisdom teeth the lowest.

CHAPTER III.

THE DEVELOPMENT OF THE TEETH.

"Now she unfolds the faint and dawning strife,
Of infant atoms kindling into life;
How ductile matter, new meanders takes,
And slender trains of twisting fibres makes:
And how the viscous seeks a closer tone,
By just degrees to harden into bone.
While the more loose flow from the vital urn,
And in full tides of purple streams return."—GARTH.

To enter upon a minute description of the method employed by nature for the production of those tissues of which the teeth are composed, would take up more space than can be alotted to it in a small work of this kind, and at the same time introduce matters of much too technical a nature for public reading.

All, therefore, that I shall attempt to do, will be to describe the mode of development of a tooth as a whole, and point out the relative periods at which these organs appear.

It has now been clearly shown from experiments, made by Arnold and Goodsir, that the development of the teeth takes place from the mucous membrane which covers the edges of the maxillary arches. When the jaw-bones are first formed, there is an entire absence of alveoli. Then a groove appears along the edge of the jaw which gradually becomes deeper, and afterwards thin bony partitions arise so as to form a number of separate cells. These osseous septa are completed at about the fifth month of gestation, and a month later the small chambers are distinctly formed.

About the sixth week of fœtal life, certain changes commence in the mucous membrane which ultimately lead to the formation

of the dental pulps; a groove is first formed of a horse-shoe shape, then a series of papillæ, ten in number, arise, being at that period simply processes of the mucous membrane, yet constituting the germ of the future milk teeth. The papillæ of the upper jaw appear first, and in each a regular order is preserved.

The earliest that makes its appearance is that for the first molar tooth, since this is seen in the seventh week, almost immediately after the formation of the dental groove, a week later that for the canine tooth may be observed. At the ninth week, the papillæ for the two incisors follow, and at the tenth, that for the last molar makes itself manifest. After this, the edges of this groove, become thickened, membranous septa stretch across from one side to the other, between the papillæ, so as to form a series of separate follicles. These divisions take place in the same order in which the papillæ had appeared, and the whole are completed at about the fourteenth week.

The papillæ have been growing very rapidly during the period, and now project from the mouths of the follicles, at the same time assuming definite and characteristic forms. The follicles then become deeper, whilst small laminæ of membrane are developed from their sides, and the papillæ are by that means hid from view. The lips of the dental groove meet and adhere together, the back one being very much thickened, the groove itself becomes obliterated, and the follicles converted into closed sacs. This occurs at about the fifteenth week. In the meantime other depressions have been forming, one behind each of the follicles, these escape the adhesion of the lips of the groove, and form the sacs from which ten of the permanent teeth will become developed in each jaw.

The papillæ (now the dental pulps) assume the shape of the future teeth, and the formation of the hard substance commences, so that by the end of the fourth month of gestation, caps of dentine may be observed on all the pulps of the deciduous teeth, and a very little later on that of the first molars of the permanent set.

The growth commences at the top, the hard substance gradually becoming thicker, and extending further down the tooth till the crown is formed. A constriction then takes place for the neck, and an elongation downwards to construct the fang. Meanwhile, another process has been going on, by which the outer surface of the crown has become covered with enamel. The crown having been completed, it makes its appearance through the gum, the fang is perfected on its surface, the hard substance supplants the whole of the pulp except a small portion in the centre of the tooth, which becomes supplied by a small thread of nerves and blood vessels entering through a minute aperture left at the point of the fang. This process is slightly modified where there are two or more fangs, or complete crowns, but the principle upon which it proceeds is the same.

At birth, the crowns of the first teeth are completed, and the formation of the fangs commencing. From the seventh to the fourteenth month, seldom earlier than the former, and scarcely ever later than the latter, they begin to make their appearance through the gums. It has occasionally happened that one or two may have found their way through the gums before birth, but these cases are extremely rare. The order in which the teeth appear is regular, the central incisors of the lower jaw first, followed speedily afterwards by those of the upper jaws. It may be observed as a general rule, that all the lower teeth rise through the gums earlier than the corresponding ones in the upper range.

At about the age of nine months, the two other incisors make their appearance, and at twelve months, the first molars. The canines generally find their way through the gums at about the eighteenth month, and the set is completed at the end of two years by the eruption of the last molars.

The permanent teeth are developed very much upon the same principle from the small lunated depressions before referred to behind the follicles of the temporary teeth. They continue to

grow until they ultimately force out the milk teeth and take their places. In the case of the six additional molars, the process is somewhat modified, as the dental groove in which they are developed, had not become obliterated at the same time as the rest, but remained opened for the development of the papillæ from which these superadded molars arise.

The permanent teeth and milk teeth are both in the gums at the same time, but separated from each other by a bony partition, which together with a great portion of the temporary tooth, becomes absorbed. This process having gone on sufficiently far, the milk teeth are loosened, and fall out, and their place is at once occupied by their permanent successors.

The greatest number of teeth are to be found in the jaw just before the shedding of the temporary incisors; that is about the fifth year, as then the whole of both permanent and milk sets are present, with the exception of the wisdom teeth, making in all forty-eight.

The permanent teeth generally begin to make their appearance through the gums, at from the fifth to the seventh year. The following table from Mr. Cartwright shows the average age at which this occurs, and the relative order in which the teeth appear. The lower jaw is selected for the purpose, in the upper jaw the appearance is a little later.

Molar, first Incisors, central	5 to 7 years
Incisors lateral	7 to 9 „
Bicuspids, anterior	8 to 10 „
Canine	9 to 12 „
Bicuspids, posterior	10 to 12 „
Molars, second	12 to 14 „
Molars, third or wisdom teeth.	17 to 25 „

Sometimes, however, the wisdom teeth do not appear till much later than this; it has occasionally happened that their eruption has not taken place till old age.

CHAPTER IV.

THE PURPOSES AND USES OF THE TEETH.

"In human works, though laboured on with pain,
A thousand movements, scarce one purpose gain,
In God's, one single can its end produce,
Yet serves to second too, some other use."

In no part of the body will organs be found more admirably adapted both for use and ornament than the teeth.

Much of the fascinating charm of a lovely countenance and the grandeur of expression in the human face are due to their presence, whilst the part they play in the animal economy is by no means trivial. Speech, one of the highest attributes of man, is imperfect without their aid, and beauty droops and hangs its head when they are absent. Digestion flags, and stomach diseases supervene when the teeth are deranged, and disturbance in the most remote part of the system is very likely to find a sympathizer in the dental organs. Their first appearance in the infantile mouth is usually marked by constitutional derangement throughout the system, the early signs of approaching motherhood they frequently indicate by their acute twinges, and old age generally makes his first attack on their domain. The coquette entraps as much by her pearly teeth as by her eyes, and more muscular man is not seldom proud of their perfection in his own mouth.

The first and primary purpose of the teeth is to reduce the food to such a condition as that the digestive apparatus of the stomach may operate upon it with ease. Hence they will be found to vary in appearance according to the nature of the diet on which the animal feeds. It will appear obvious enough to the most superficial observer, that the broad flat surfaces pre-

sented by the teeth of the horse or the elephant would be useless in tearing to pieces the flesh of other animals, and on the other hand, how inconvenient would be the sharp lacerating teeth of the lion and the tiger, if used for the purpose of crushing grain or vegetables. So diverse in truth, are the teeth in different animals, that classification has been founded by naturalists upon them. Birds possess no teeth, the deficiency thus caused is made up by the gizzard being supplied with a powerful muscular structure, and lined with a horny covering. The food is here triturated with stones and other hard substances that have been swallowed for the purpose. Some of the mammals are deficient of teeth, for instance the armadillo, and the ant-eater, but these do not require them. In the whale, the teeth consist of a series of horny plates, well known under the name of whalebone. These proceed from the upper jaw, placed vertically, and overlap each other like tiles; the external edges are sharp, and the internal furnished with long hair like fringes, which answer the purpose of entangling the food as though in a sieve. In carnivorous animals the teeth are sharp and pointed, for the purpose of tearing the food; and in the herbiverous, broad at the upper part of the crown, so as to enable the possessor to grind grain and herbs. In the rodentia, or gnawing animals, such as the squirrel, another particularity is met with, part of the teeth resembling chisels, and with these the most surprising operations are performed. Man, in proportion to his size, has teeth smaller than any of the other mammalia.

The important part which these ogans play in masticating the food, is obvious enough to every one. In their absence, the materials taken into the mouth have to be swallowed almost without any change having taken place since the process of cooking was completed, and the result may be easily predicated. However strong the digestive apparatus may be, it is quite impossible it can long perform the work of the teeth without injury, and indigestion therefore speedily ensues. But indigestion is only the beginning of a series of disorders which will arise in

consequence of it in every part of the body. Not long can it reign alone; a train of ills follow at its heels, and very speedily make themselves manifest. Indigestion is a simple word, and the disease it indicates considered trifling, but never was a greater mistake made than this, as every one knows to his cost, who has experienced the penalties that it levies on the system.

Perfect mastification will, in very many cases, preserve healthy digestion, and to accomplish this, it needs but sound teeth.

Speech again, cannot be perfect without the teeth. It is not necessary here to explain how the sound produced in the larynx is moulded in the mouth by the aid of tongue, cheeks, lips, and teeth, into that divine faculty of humanity, speech. Suffice it to say, that every one knows how this power becomes interfered with even when but one of the front teeth is absent. Certain words cannot be pronounced, and an impediment in the speech is at once observed. Not unfrequently has it happened before the invention of artificial teeth, that most distinguished orators have almost ceased to practise their sublime art through the loss of a tooth, not being able to bear the thought of laying themselves open to the charge of imperfect articulation. Fortunately this occurs no longer, as artificial substitutes for the natural dental organs, will, if made properly, remedy all defects of this and every other kind. Those supplied by me are particularly adapted for articulation, and as I shall hereafter show, cannot possibly be detected.

The use of the teeth as an ornament, that is, as a portion of that beauty which has been the subject of so much admiration in the artist and the poet, I shall not here dwell upon, having entered upon it at considerable length in another work.*

Every one knows how Old Time's, "effacing fingers" leave their marks behind them by destroying the teeth. Nothing can present a more striking contrast than a face with the full complement of sound teeth, and another with many or all decayed, or lost.

* "Youth, Beauty, and Refinement," by Edward Davieson.

CHAPTER V.

THE PATHOLOGY OF THE TEETH.

"Man is all symmetry,
Full of proportion one limb to another,
And to all the world besides,
Each part may call the farthest, brother,
For head with foot hath private amity,
And both with moons and tides."—GEORGE HERBERT.

In these days, when the science of pathology is making such rapid strides, and when certain constitutional tendencies are becoming as accurately known as the diseases to which they give a predisposition, it is surprising that the teeth have not also been considered in this light. Partaking, as they do, of the nature of the osseous tissues, and subject to the action both of the air exhaled from the lungs, and the gases escaping from the stomach, no organs are more likely to become affected by the general condition of the system. There can be little doubt that many very important pathological facts might be gathered from the appearances presented by the teeth, were they made the subject of the same careful examination as other parts of the body. The pulse, the eyes, the skin, the tongue, are always taken into the most careful consideration in diagnosing disease, but the teeth are constantly neglected. In endeavouring to ascertain the constitutional diathesis, all parts of the body should be accurately observed. The only important omission made is probably the dental organs. Every one is acquainted with the different appearances presented by the teeth in different persons, yet few attach to these divers aspects that importance which they deserve.

Sometimes the teeth are of a dense yellow hue, and that entirely independent of any neglect in cleaning them, and in

other cases, are of pearly whiteness. One individual is able to masticate glass, or crush even harder substances between his teeth, and another cannot bear them touched with a common quill toothpick. In one person, they are so brittle that under the least pressure they snap and break, and anon we find them with the toughness of leather and the hardness of steel. All these appearances are indicative of a peculiar constitutional diathesis, as much so as the difference in the colour of the hair and eyes. This is a matter which has been up to the present time but little considered. The application of a knowledge of the temperaments to pathology has as yet, been hardly turned to any account. Hereafter, no doubt, this will be done, and by it a great point will be gained, if not in the treatment of disease, at least in its prevention. Once let every one who cares for the preservation of his system in health, become acquainted with the diseases to which he has a pre-disposition, and he will take care to avoid those circumstances likely to act as exciting causes, and consequently to enable a latent affection to become manifest. When this is done thoroughly, the teeth must be taken into consideration as parts of the great whole in every portion of which the indication may be observed. The teeth of those persons who are of a scorbutic or tubercular diathesis can never be mistaken; they are transparent, white, looking like alabaster, and generally very much admired. In appearance, they resemble the deciduous or milk teeth. Females pride themselves on them, and men are fascinated by a smile playing over them. They are, however, but the too certain forerunners of

> "That dire disease whose ruthless power,
> Withers the beauty's transient flower."

The classification of the teeth with reference to their pathological relations has been suggested by Dr. A. C. Castle of New York, in which the following arrangement is adopted,

1. The large dense yellow teeth.

2. The dense yellowish white teeth.

3. The chalky white teeth, the transparent yellow white teeth, and opaque chalky yellow teeth.

4. The transparent white, and the chalk white, and the blueish white pearly teeth.

This arrangement is by no means so perfect as could be wished, still it is the only attempt that has been made to classify the teeth in groups, with reference to the peculiar diathesis of the individual.

The possessors of the first class are usually vigorous and muscular, with sound constitutions and enjoying good health. The teeth themselves are in a healthy condition, and should they decay, as they often do, it is rarely from any disease of their substance, but usually from external influences that may happen to operate upon them. This will be effected by vitiated gases and acidified matter arising from the decomposition of substances taken into the stomach, or from materials that may be injurious to their structure introduced into the mouth. The tooth will become denuded of its enamel, and the crown then rots. In such cases, a new material is usually deposited, which though differing entirely from the enamel, has yet all the hardness of that substance, and admirably supplies its place. These kind of teeth are also subject to caries. The most common phenomena witnessed in connexion with them is, however, the wearing down by triturating the food. When this happens, the nerve and blood vessels recede, and a hard, bony substance is deposited, which renders them still very useful.

The second class occur in persons of the temperament called nervo-sanguine. They are subject to nearly the same diseases as those of the first group, but the process of repair is much slower.

They are whiter than the first named, because they contain a less quantity of lime. The individuals in whom they occur are less muscular and vigorous than those who possess the large dense yellow teeth, still they generally enjoy very good

health. Their features have a softer expression, and their lineaments a full and rounded form. Scurvy in the gums, they are, according to Dr. Castle, peculiarly susceptible of. The teeth too are more liable to decay than those of the preceding class, being much less hard. Nor are they so firmly fixed in their sockets, and consequently, frequently fall out when quite sound, more especially after scurvy. When decay has taken place, the mortified portion is moist, soft and of a dirty brownish colour, whereas in the preceding class, it is rough and dry, and has a stringent taste upon the tongue.

The third class are indicative of a strumous diathesis, and the teeth themselves present a striking illustration of defective ossification, imperfect combination, &c. There is a great preponderance of lime in their structure, hence they are extremely brittle and friable. This renders them exceedingly liable to be fractured, and frequently they crumble to pieces in the mouth. They are also very delicate and highly sensitive. Heat and cold, therefore, acids and sweet juices will generally occasion pain. The alveoli are thin and very unyielding, and the teeth are consequently often crowded and assume other irregular appearances. Or, on the contrary, they are sometimes painfully regular. Spots of almost pure lime are frequently seen upon their surfaces, and often deep indentations or holes may be observed. They are still less secure in their sockets than the preceding, the gums are flaccid and spongy, and the slightest constitutional disorder irritates them. They are extremely susceptible to decay, either in their own structure or by the action of external agents upon the lime spots. In females, during the period of utero-gestation, they are very liable to pain, and as puberty comes on, they generally give indications of disease and decay. In stopping or treating them in any way, they require the greatest care and skill, or the result is, that not only is no improvement effected, but matters are made much worse. I have known a score of cases where these kinds of teeth have

been stopped without any regard to their structure, and the results have been most disastrous. The ordinary materials used will break down the tooth within a very short time, and leave the nerve exposed, giving rise to the most excruciating pain. I am always compelled to adopt a peculiar process with teeth of this class, and by so doing, I avoid the results which too generally arise from interfering with them.

The fourth group are the almost certain forerunners of premature death, from that fearful malady which sweeps off every year so many of the fairest of the fair, and selects its victims in nine cases out of ten from amongst those who have been most highly endowed by nature on the score of beauty. These teeth are greatly admired, but they are nevertheless indicative of the seeds of death being implanted in the constitution.

The ill effects attendant on the preceding class are met with here in an exaggerated form. They are extremely liable to decay from internal causes alone. Eructations from the stomach, and acids, and other substances introduced into the mouth, they are exceedingly susceptible to the action of, and consequently, generally at a very early age, they become destroyed.

The gums are pale, flaccid, spongy and tumid, and when the teeth break away, become apthous, swollen and liable to bleed. The breath has frequently an unpleasant odour, and the lining membrane of the mouth, often because ulcerated.

The last two groups are much more liable to tartar being deposited than any others, and consequently require more care in their management. In both, the greatest skill is required in plugging or stopping them. Thousands of persons who possess teeth of this kind have them completely destroyed by unskilful dental treatment, and all therefore ought to exercise the most scrupulous care in selecting a surgeon-dentist who thoroughly understands these peculiarities of constitution. This fact should be stored in the memory of every reader of these pages.

CHAPTER VI.

TOOTH-ACHE.

"There was never yet philosopher,
That could endure the tooth-ache patiently,
However they have writ the style of Gods,
And made a pish at chance and sufferance."—SHAKSPEARE.

In devoting a separate chapter to tooth-ache, and discussing it before proceeding to notice the diseases to which the teeth are liable, may be deemed somewhat unscientific, seeing that this painful affection is frequently but a symptom of some other disease. The truth is however, that tooth-ache, whatever category it may occupy in scientific minds, is with the public a separate disease, and one which, from the frequency of its occurrence, and the tormenting nature of its attacks, is certainly deserving of special consideration.

Besides, it is one of those affections which, in a great number of cases where it occurs, is most easily remedied, and in nearly all might probably have been prevented, and therefore some few remarks upon it, independent of those diseases, described under more technical names, the presence of which is less common, and the treatment more difficult, is quite justifiable in a work of this kind, intended as it is, for the perusal of the public.

Tooth-ache belongs to the series of those trifling ailments which are never deemed very important because they are not dangerous, and which, however violently one may suffer from, he must expect no pity nor commiseration. A pain of the tooth enough to drive him distracted who has to bear it, will

probably excite little more than a laugh in those who are free from it at the time, even though they should have become familiar with its agonies from past experience. Yet there is probably hardly any pain that our corporeal frame is subject to, of so tormenting a character, and so difficult to bear. To describe it were impossible. It must be experienced to be appreciated. Even the description of Burns falls infinitely short of the reality, and could not convey by any means a just idea of it, to a person who had never felt its twinges.

"When fevers burn, or ague freezes
Rheumatics gnaw, or colic squeezes,
Our neighbour's sympathy may ease us,
Wi' pitying moan;
But tooth-ache, hell o' a' diseases
Ay mocks our groan!"

Burns knew well enough that no adjective could convey an accurate idea of its intensity, and that if he had piled half a dozen together, they would have been ineffectual, and he therefore dubs it "hell o' a' diseases," and every one who has been visited by it, will admit that it is certainly that, whatever more. Somebody describing gout and rheumatism, said, that rheumatism resembled your foot in a vice turned so tight that you could not bear it, and that gout was giving the vice one turn more. If so, I should say tooth-ache, but that it is in a different part of the body, would be represented by half a dozen turns after gout.

Tooth-ache generally, not always, but certainly in a large majority of cases, arises from the laying bare the delicate nervous pulp through a cavity having been formed in the tooth. The fluids of the mouth, or even the air coming in contact with this, give rise to pain, and if the health be out of order, or the part very much irritated, acute inflammation is the result, and the pain becomes all the more violent. It will appear obvious enough that had such teeth been attended to properly—for

example, had it been stopped with my Liquid Enamel hereafter to be described—no such effects could have been experienced. We will suppose, however, that it has occurred, then what is the remedy? To give a simple list, without comment, of all the agents that have been recommended for tooth-ache, would occupy the whole of my small work. Everybody has a favourite remedy for this pain, which they invariably recommend to others, but seldom try, themselves. It may be commonly observed that if you are complaining of tooth-ache, the first old lady who hears you, will tell you at once of an infallible specific, though did you know her intimately, you would probably have seen her the day after suffering the same torments that you were, and never once thinking of her remedy. Cold water is recommended, hot water is prescribed, in the former case it should be iced, in the latter nearly boiling. The effect of both these will be at once perceived by calling to mind what has been stated in a previous chapter. If they do not increase the pain, and produce permanent injury upon the teeth, it is not your fault.

Salt is a fine remedy, so is pepper, so is mustard, so is brandy, (the most agreeable of all, perhaps,) so is tobacco, and in truth, nearly everything you could name. The only wonder is, how people have tooth-ache at all, considering that they all take three or four times a day some of these ingredients, and sometimes all of them. The more scientific remedies, however, are deserving of a little more attention, they are of various kinds, and about as contradictory as the hot and cold water.

Liquid ammonia is recommended to be applied on a piece of lint, the result being that the nerve is immediately cauterized, and the pain stopped. Probably, and the tooth destroyed, to become the seat of a worse pain than ever in a day or two. *Nitrate of silver,* the result ditto; *Sulphuric acid* I have even known recommended, the effect of which of course is ten times worse. *Creasote* is often prescribed—disgusting to the taste,

useless in nine cases out of ten for the pain, and injurious to the teeth, may sum its virtues. Dr. Turnbull in the "Lancet" a few years ago, recommended *Capsicum* as a remedy for (queer combination) tooth-ache and chilblains. I say nothing of the latter, but common sense, one would think, would be sufficient to show that so hot and burning a substance must be very unsuitable to apply to a nerve already too much irritated as that of the tooth is, in the majority of cases where pain is experienced. M. Ebrard says that "he has always found tooth-ache yield in from half an hour to two hours after friction of the gums on the affected side with *Muriate of Morphine* in powder." To which I reply, very likely, as a powerful narcotic like Morphia, is certainly calculated to lessen pain by numbing the nerves in any part of the body. But, in the first place, the relief in most cases will be very temporary, since the cause of the affection still remains, and as soon, therefore, as the effect of the narcotic has passed off, the pain will return again as violently as ever. Secondly, the remedy is a most dangerous one, not to the teeth, but the whole system. Imagine a number of ignorant persons rubbing into their gums so subtle a poison as Morphia, a few grains of which is sufficient to produce death, and the result may easily be foreseen. The same remarks will apply in a measure to *Chloroform*, also much vaunted at the present time as a favourite remedy. Extraction of course is effectual, so is amputation of the arm for a disease of the hand, but in either case, a remedy one would prefer avoiding. A few years ago, a system was proposed of extracting the tooth so as to divide the nerve, and then replacing it. This was useless. The nerve speedily adheres again, and the pain returns, and the tooth, till such adhesion takes place, is as destitute of sensation as an artificial one, and far less convenient, because it is not fastened.

As has been before remarked, if my Liquid Enamel were used, no tooth-ache would occur. Suppose it has taken place, how-

ever, the tooth can be stopped with the same agent by a most simple process, and the cause of the disease removed by that means.

Any one can use it without difficulty, and it is perfectly harmless, both to the teeth and to the general system. But more on that subject hereafter. Suffice it to say, that he who suffers tooth-ache, deserves to endure the pain, because the remedy is simple, easy, and within the reach of every one.

CHAPTER VII.

AFFECTIONS ARISING FROM DECAYED TEETH.

"Medici, causa morbi inventa, curationem inventam putant."—CICERO.

DECAY of the teeth, like most other ills, hardly ever comes alone. A variety of affections in different parts of the body arise from it, and frequently puzzle the medical practitioner, who never suspects their true cause. This is naturally to be expected. Organs which play so important a part in the animal economy as the teeth, can hardly ever become deranged without bringing a host of other physical disorders in their train. The most startling fact in connexion with this matter is, that very often the most serious results arise when there is an entire absence of pain in the tooth. The consequence of this may be easily perceived; the patient himself never suspects the teeth of any share in the general mischief, and will frequently protest that they cannot possibly have anything to do with it.

I could relate a hundred cases where diseases of a most serious character, such as deafness, and paralysis of the face have had their origin in a bad tooth, the real cause never being once suspected either by the medical man or the sufferer. It may appear improbable that such effects can spring from so trifling a cause, but it was remarked, I think by Gall, in reference to another matter what is applicable to this, "I never said it was probable, I only said it was true." In this case, however, the improbability is not great, because the *modus operandi* is not difficult to explain. Abscess of the parotid gland is a common result of decayed teeth, and such abscess

may easily lead to destruction of some of the branches of the seventh pair of nerves; the inevitable result of that being paralysis of the face. In all diseases of the face and head at least, the teeth should be carefully examined. In children, every one knows what serious results frequently arise from teething. This is simply because the irritation of the nerves in the face is calculated to produce the most severe local disorder, and at the same time general constitutional disturbance. Total blindness not unfrequently happens, in the case of children from such irritation, and no reason can be assigned why a similar cause should not lead to an analogous result in the adult. Indeed, that it is so, no one can doubt whose experience in such matters has been at all extensive.

Small tumours growing at the roots of the teeth in the upper jaw have frequently set up an inflammation giving rise to a sanguineo-purulent secretion which has filled, what is called in anatomy, the antrum, and during the night made its way into the throat to be coughed up in the morning, leading the patient to believe himself suffering from lung disease. Many cases of coughing and spitting of blood are really nothing more than the results of disordered teeth.

Not unfrequently a decayed tooth, the decay taking place at the roots and therefore unsuspected, will produce symptoms very much analogous to lock-jaw. The patient is unable to open his mouth, lives for weeks upon the small portion of fluid-food introduced between the clenched teeth, and after the best medical treatment has failed, makes up his mind that he must die. I saw a case of this kind recently, detected at once that the real cause of the disease was in the teeth, attended to those organs, and the patient recovered.

Pseudo-epileptic affections have been often known to arise from the teeth, and to continue for years without the true cause ever being dreamed of. I have not unfrequently seen young men and women with a dull and inanimate stare, and a kind of

idiotic look which had continued for three or four years, and a general derangement of the health, together with many other symptoms which were never suspected to have their origin in the teeth, and yet have all suddenly disappeared as soon as these organs have received proper attention. A case of this kind came under my notice about six months ago. The subject was a young woman of prepossessing appearance about 18 years of age. She had always enjoyed good health till within two years of the time when I saw her. At this period, however, she complained of violent headache darting into the brain, pain in the eyes, stiffness of the neck, numbness of the right arm, difficulty in swallowing, and a kind of convulsions occurred every two or three days, in which there sometimes was a great rigidity of the muscular system, and at other times a kind of coma.

All sorts of medical treatment had been resorted to in this case, blisters, setons and counter-irritants of every kind, till at last the young woman had given them all up in despair, and made up her mind that her career on earth was to be a short one. One day a friend of hers whose teeth I had attended to, recommended her to let me examine hers. I did so, and found that the wisdom teeth, which had been cut unusually early, were in a complete state of decay, together with some of the other molars.

To be brief, at the root of each of these, was found a small abscess. These being attended to, a few weeks restored my patient to perfect health.

The production of tumors in the face, are the well known result of carious teeth. Frequently these are so severe as to be mistaken for cancerous growths. Sometimes they occur on the tongue, presenting a dark, fungoid appearance, occasionally bleeding and causing violent pain. On removing them, they rapidly grow again, and in numerous cases have been treated by the surgeon as malignant, and never suspected of any con-

nexion with the teeth. Abscesses in the cheek are most common effects of diseased teeth. These often burst, or are opened and remain open for years, forming fistulous sores which will continue till the cause be removed.

Nor are these openings always in the immediate neighbourhood of the offending tooth, sometimes they are a considerable distance apart. Occasionally they appear in the throat, almost as low down as the sternum.

When tumours and abscesses occur, they interfere very considerably with the functions of the surrounding parts. Thus frequently we shall find blindness on the affected side, contraction of the muscles and other results.

In all diseases which it is in any way possible may have originated with the teeth, these organs should be subjected to a careful examination by some one who thoroughly understands the matter.

Had this been done to a greater extent, many a valuable life might probably have been preserved; at all events, very much pain and suffering might have been avoided. One of the most important matters, therefore, in connexion with the teeth, is the investigation of those diseases which spring directly or indirectly from decay in the dental organs.

CHAPTER VIII.

MANAGEMENT OF THE TEETH.

"What makes all physical and moral ill,
Here nature deviates, and there wanders will."—POPE.

THE teeth, like almost every other part of the body, frequently have to suffer for neglect. As there is a natural secretion continually being deposited upon them of a character injurious to their structure, and as they are employed so frequently in the process of masticating the food, small particles of which will be left adhering to their surfaces to undergo fermentation, and act chemically upon their enamel, no portion of the physical frame requires more care and attention. The gases escaping from the stomach, and the vitiated air exhaled from the lungs, too, are calculated to produce a very disastrous effect upon them, unless great care and pains are taken to prevent it. On the whole, perhaps the teeth are more neglected than almost any other part of the body. It is quite true, that recently much more care and attention have been bestowed upon them than heretofore, and that at present they are not totally neglected by any but the very lowest classes. But then the very means taken to preserve them, in too many cases are but calculated to hasten their decay and accelerate their destruction. Tooth powders are, in the majority of instances, not only worse than no application at all, but they frequently contain ingredients more injurious to the teeth than any other that could be invented. Should some ingenious person rack his brains to discover an application which should destroy the teeth most readily and

most rapidly, he probably would find nothing to answer the purpose so well as some of the tooth-powders puffed off in advertisements, and meeting with a large sale at the present time.

The first point to be observed in the regulation of the teeth, is to avoid, as far as possible, the introduction into the mouth of those substances that are known to exercise an injurious effect upon their structure; and in cases where it is impossible altogether to avoid them, always either to clear away thoroughly all traces of their presence, or apply an antidote to their action. These substances are various. It need hardly be remarked, that anything of an acid character has this effect. Hence, unripe fruit, vinegar, sour wines, and everything of that kind, should never be taken without washing out the mouth well afterwards. Medicines of an acid character, such as Tincture of the Sesquichloride of Iron, or as it is more commonly called, Tincture of Steel, should if possible be swallowed so as not to come in contact with the teeth to a greater extent than is absolutely necessary. Many other agents daily taken into the mouth have an injurious effect.

A controversy has long been carried on as to whether sugar produces any objectionable effect upon the teeth; a hundred years ago the opinion was next to universal that it did. Lately many have been disposed to doubt the truth of the theory. Some few years since, a series of elaborate experiments were conducted by Mr. Larrey, with a view of determining this point, and he arrived at the following conclusions.

1. "Refined cane or beetroot sugar is prejudicial to the teeth, more from its direct contact than from the evolution of gaseous matter during digestion."

2. "If a tooth be allowed to macerate in a saturated solution of sugar, it is so decomposed as to acquire an almost gelatinous character, whilst the enamel becomes opaque and spongy, and

crumbles down under the slightest pressure. Sugar ought not therefore, to enter into the composition of tooth-powder."

3. "The erosion of the teeth by this substance does not depend on an acid, for none is present in sugar, but on the affinity which this organic principle has to enter into combination with the calcareous base of the tooth."

4. "If the enamel be less attacked than the osseous part of the tooth, the reason is that it contains Fluoride of Calcium, a body which resists chemical agency even more than the Sulphate of Lime."

This experiment appears tolerably conclusive, especially that part of it which consisted in macerating a tooth in a solution of sugar. Other persons have since followed up the investigation of this subject, and many of them have arrived at nearly the same conclusion. One gentleman writes, "The tooth I used for the experiment was a thoroughly sound one, without the least speck, and nineteen grains in weight. I put it in a solution of six drachms of sugar, and three drachms of water, in a temperature of 32°—36°. In three weeks the tooth lost about seven grains, without a change in the solution, and in analysing it, I found that only the carbonate and phosphate of lime were consumed."

Whenever, therefore, sugar or very sweet substances are taken into the mouth, the teeth should be well cleaned afterwards, so as to prevent any of the saccharine matter from hanging about them.

The natural secretion or deposit of tartar upon the teeth, will also produce a destructive effect, if not kept constantly cleared away.

As has been stated in a previous chapter, this is greater in some constitutions than in others, and some teeth are more easily injured by it than others. In all it is present, and there are probably no teeth which it will not injure, more or less. Certain diseases augment its quantity as do also taking spices,

chewing tobacco, or any other agents that irritate the gums. In persons who are strumous and ricketty, it is usually deposited in large quantities, or if not, the teeth become surrounded by a filthy green material, of a most corroding nature, which eats into their substance, and produces speedy destruction. In old age, tartar is deposited in large quantities.

One proof of the destructive character of those agencies which operate upon the teeth continually, is found in the fact, that artificial teeth, made of ivory, decay in precisely the same way as do the natural living ones. Those portions in contact with the lips and tongue are comparatively unaffected, whilst in the necks and masticating crowns of the molars, the decay goes on most rapidly. The materials with which they are fixed, if of the ordinary character, will corrode completely away. What is then to be done to keep the tartar cleared away. This is only to be accomplished by constant attention to cleanliness. The teeth should be well cleaned daily with a soft brush and tepid water—cold water has an injurious effect upon them. Every particle of the food, together with any tartar that may have become deposited, should be kept constantly brushed away.

The most destructive agent upon the teeth is, however, the very material employed for the purpose of keeping them clean; for tooth-powders are in ninety-nine cases out of a hundred, most pernicious in their effects upon the teeth. The majority of them contain ingredients of the most injurious character, and they should one and all be avoided.

Whiteness in some cases they may produce, but it is not the healthy hue, but the pearly aspect of disease. Not unfrequently is mercury introduced into tooth-powders; the result need not be enlarged upon, since it must be obvious to every person. Camphorated chalk is a common ingredient, and to its constant use must be attributed the extreme prevalence of what is technically called *fragilitas dentium*, or unusual brittleness of the teeth. Any one may convince himself of the effects of

camphor on the teeth by a very simple experiment, analogous to the one referred to with the sugar. Let a sound tooth be placed in chalk impregnated with camphor, or in camphorated spirits, and in a very few days an appreciable alteration will be observed in the enamel. On no occasion, therefore, should it be used as a dentifrice. In placing an instrument on a tooth, the operator can at once tell if camphor has been used.

In all cases where it has, the tooth is extremely brittle, and easily crushed, whilst at the part nearest the gum, the enamel being thinner there, it crumbles away almost to dust. This occurs whether the camphor be used in tooth-powder, or applied in spirit, for the cure of tooth-ache, a very popular remedy. I have noticed cases in which a set of teeth most sound and healthy, have been completely destroyed in a few months by the use of camphor. First, small pieces of the enamel break off, then larger, then violent tooth-ache comes on, and extraction is resorted to. Frequently, from the extreme brittleness of the tooth, it is broken off, and the stump left in the gum, to torment the poor sufferer for years longer.

Not only camphorated, but every kind of tooth-powder, should be abolished at once and for ever. The Liquid Enamel prepared by me, and which I shall presently describe in another chapter, will keep the tooth perfectly white, and exercise no injurious effects upon them whatever. It is as harmless as it is effectual for the purpose for which it is used.

CHAPTER IX.

INFLUENCE OF MERCURY UPON THE TEETH.

"And now the staggering braves, led by despair,
Advance, and to return the charge prepare.
Each seizes for his shield, a spacious scale,
And the brass weights fly thick as showers of hail
Whole heaps of warriors welter on the ground,
With gallipots and broken phials crown'd;
Whilst empty jars the dire defeat resound."—GARTH.

So potent is mercury in its effects upon the human system that a very frightful disease, originating solely in its use, has been described in all good books on medicine, and received the name of hydrargyrium. It is true it consists principally of an eruption upon the skin, but every part of the body becomes involved in its general consequences. That the teeth will be one of the first classes of organs that this poisonous drug will produce its destructive ravages upon, may be supposed obvious from the fact that salivation is one of the earliest manifestations of its influence. Though this effect is simply the excessive action of certain glands placed in the mouth, yet their close proximity to the teeth cannot but render all derangement in their functions, injurious to the parts around them.

The use of mercury as an ingredient in a dentifrice of any kind, no matter what high sounding name it may be known under, should be religiously avoided, or entire destruction of the teeth must necessarily follow; but not only will this effect be produced when the metal is applied directly to the dental organs, it will occur more or less where the mercury has been adminis-

tered externally for any other disease. In a large proportion of cases of those persons who are compelled to consult a dentist with regard to the state of their teeth, the affection under which they labour will have been caused to some extent by their having at some period or other in their lives swallowed numerous doses of this drug. I am not here, of course, entering upon the question whether such an agent was administered judiciously or otherwise. Such is foreign to my purpose in this work, and does not fall within the legitimate province of the profession to which I belong. But I am justified in saying that where destruction of the teeth has taken place, the patient, should he have been accustomed to take mercury, ought to look upon that fact as a probable cause of the decay in his dental organs, and that to the dentist whom he may happen to consult the matter is a very important one.

It has been very wisely held that to discover the cause of a disease is half the cure, and there is no point to which the adage applies with greater force than to this. Decay of the teeth from one cause may appear to him who has not thoroughly studied the subject, to be the same as decay from another. In other words, so long as the teeth are destroyed, the particular nature of the agency that led to such destruction is unimportant. Nothing can be a greater mistake than this. In different cases the treatment to be successful must be different, and one of the first points to be ascertained by a dentist who thoroughly understands his profession, is the particular nature of the causes which have led to those derangements that he is called upon to remedy. Hence the great necessity of dentistry being regarded not as it has been hitherto as a superior kind of mechanical trade, but as a speciality of medicine, and a branch of the great and noble science of healing.

That mercury produces a most destructive effect upon the bones in general, every one is probably aware; that such effects having been once accomplished, are most difficult to remedy, is

also tolerably well established. Pains in the joints, and sometimes lameness for life, or even caries terminating in death are not uncommon cases. That the teeth are as likely to suffer as the rest of the bony structures, appears to be so obvious that it requires no proof nor any elaborate arguments to demonstrate it. The truth is, however, that the teeth are much more easily affected than any of the other osseous tissues, the one reason, probably, being that they not only suffer through the general constitution in common with the rest, but being exposed in the mouth, the direct contact of the metal with them has very frequently taken place. In children, nothing is more common than for the first set of teeth to be completely destroyed by frequent doses of calomel, grey powder, and other agents of a similar kind, when the effect on the constitution is in no way observable. In adult life, the results of mercury are almost certain to make themselves manifest first upon the dental organs.

Those persons who, at any period in early life, may have accustomed themselves to taking mercury should, no matter whether any palpable symptoms be present or not, at once proceed to a very careful examination of their teeth, in order that should the work of destruction not have become sufficiently advanced as to render extraction inevitable, or worse consequences impossible to be avoided, the evil may be remedied before it has passed beyond the reach of any preventive agent.

"Our most important are our earliest years,"

said Cowper, and he was right; but that time having gone by, all that can be done is to remedy, as far as possible, the evils arising from the acts of those years.

Dr. Hooper in his "Medical Dictionary," a book in high repute, says that "mercury when it falls on the mouth at times produces such severe inflammation that mortification frequently ensues." In this case, the action on the teeth may be easily judged of. Even when the general effect is of a much less

violent character, the dental organs will not be likely to escape free from injury. In all cases, therefore, where decay in the teeth has commenced its ravages, an investigation should at once be made as to whether it may not arise from mercury, and if it should so turn out, advice instantly sought of some one who thoroughly understands the effect of this drug upon the teeth, and who knows how to remedy the evil as far as a remedy is possible.

This is really a matter of very great importance, though one which has been very much overlooked. In some hundreds of cases which have come under my notice, I have met with the most frightful destruction of the teeth from the system having been impregnated with mercury for some years, which results might have been easily avoided by attention being paid a little earlier. For example, the Liquid Enamel hereafter to be described would have acted as a preserver of the teeth under circumstances even as unfavourable as that of the influence of mercury. At the same time, the drug itself should be avoided as far as possible.

CHAPTER X.

ON STOPPING DECAYED TEETH.

"A little fire is quickly trodden out,
Which being suffered, rivers cannot quench."—SHAKESPEARE.

THE rapid advances made by Science within the last few years, are as startling as they are beneficial. Scarcely a branch of human knowledge but has made more gigantic strides during the last ten years than in any preceding half century, and hardly any substance that we use at the present time, whether as a necessity or a luxury, but either owes its existence entirely to modern discoveries, or has at least received great improvement from them. The application of art to the treatment of the teeth is one of these modern improvements which cannot be too highly prized. Considering the uses and importance of the dental organs, a point that has been fully treated of in a previous chapter, it must appear obvious enough to the most superficial observer, that any agency by which the ravages of decay in their structure can be arrested or repaired, cannot fail to be regarded by mankind as a great boon; whilst the fact, that when destruction has done its worst, and the teeth are completely gone, the deficiency can still be supplied by a substitute as useful, frequently much more beautiful, and almost as convenient as those formed by Nature herself, should be ranked with some of the greatest discoveries of this modern age.

It has been already stated that tooth-ache arises from the action of the air upon the pulp of the tooth, generally termed the nerve, and it will therefore follow as a necessary consequence,

that if the small aperture by which the air is admitted, when the work of decay is just commencing, had been stopped or plugged, no such pain could have possibly taken place. In addition to this destruction of the whole of the substance of the tooth, when once the action of the oxygen of the air is permitted upon its internal and more delicate parts, is a work most rapidly accomplished. It will be, therefore, at once apparent how desirable it is to prevent this, and the only method of doing so, is by filling up the opening through which such influence takes place. To enlarge on the necessity of plugging the teeth as soon as they have begun to decay, would be a work of supererogation, since there probably does not exist an individual who is not already as fully convinced of its importance as I am. Every small publication issued by every small dentist, endeavours to enforce it, and it is as well known a remedy amongst all classes, high and low, as the most popular articles in a domestic medicine chest.

There are other facts in connexion with it which are not generally known. To stop the teeth is a very simple expression, and apparently thought by many to be an equally simple operation. Various substances have been used for this purpose. The common opinion is that you have but to learn what they are, and proceed at once to the work. There is a difficulty here, however, which is not calculated upon. It must be borne in mind, that you are engrafting a dead, inorganic material, upon a living, organized tissue, and that to accomplish this, requires in the first place some skill, and a thorough knowledge of the parts, so as to judge of the circumstances under which it is done, and secondly, an equally accurate knowledge of the materials employed. The cases in which injudicious plugging have done very much more harm than good, are by no means rare; scarcely a day passes in which I am not called upon to undo work of this kind—by no means an easy task, and one which, when accomplished, is not very satisfactory. Very frequently it happens

that stopping a tooth does but increase the pain and accellerate its decay. In such a case the material has been wrongly selected, probably employed at a wrong time, and injudiciously applied.

In inflammation such as there is often present when the tooth is painful, it need hardly be said that to close the only aperture through which the escape of any matter that may be formed, can take place, must be a most disastrous procedure. Yet this is not unfrequently done. When the tooth is brittle, a circumstance somewhat common from the use of tooth-powders—metal stoppings can have no effect but to break it down most rapidly and to hasten the destruction of its entire substance. Plugging the teeth injudiciously has perhaps given rise to more abscesses at the root of the teeth, breaking out frequently in the face, and disfiguring the countenance for life, than any other half dozen causes that can be named. Medical works are full of such cases; hospital wards teem with them; and the number of those which have come under my own private observation is almost startling.

Nothing, therefore, can be more important than a due consideration and the most perfect knowledge of the circumstances under which this operation should be performed. The teeth really appear to me to have been treated like so many posts and railings of a fence. They may be cut and divided, have pieces nailed on to them, and operated upon in every way the same as though they were destitute of vitality. They are, however, living organisms, and must be treated as such. Every operation performed upon them must be done with due regard to this important fact, or it becomes, not simply useless, but most injurious, and to say that it is worse than doing nothing, is to speak of it more mildly than it deserves.

If the teeth are properly plugged, and with materials appropriately selected, the result is in the highest degree beneficial. Tooth-ache is prevented from again occurring, and the decay of

the tooth arrested. Mastication can be performed as well as ever, and in every sense the tooth is as perfect as before the destruction commenced. A tooth stopped at twenty may last till sixty, without the slightest inconvenience or pain, but it must be done with great care, and a thorough knowledge of the character of its substance, and with a material somewhat different to that usually employed.

I speak on all these points from experience. Cases have come before my notice, really enough to make one grieve that organs so nearly sound and susceptible of such long preservation, should have been so frightfully destroyed, causing so much pain and inconvenience to the person in whom it occurred, and that by the very means taken to preserve them. Yet these cases are not rare, nor can it be wondered at that they are not. Dentistry, so intimately connected with a dozen sciences, and without them, not simply imperfect, but injurious, has, in the majority of cases, been abandoned to make its way even without common sense.

CHAPTER XI.

LIQUID ENAMEL.

> "The invention all admired, and each how he
> To be th' inventor missed, so easy it seemed,
> Once found, which yet unfound, most would have thought
> Impossible."—MILTON.

THE usual agents employed for plugging the teeth, are combinations of metals, and for cleaning them, tooth-powders composed as has been stated, of most injurious materials. Both should be abolished. That tooth-powders had better be entirely discontinued has been already shewn, the only question that arises is as to a substitute. That the various substances employed for filling decayed teeth are in the majority of cases injurious, it is not difficult to prove.

Not long since an announcement flared in the pages of medical journals, that a fine cement for teeth might be made with anhydrous phosphoric acid, and pure lime. Whether any wiseacre at present employs it, I am not in a position to say, but trust, if so, he will not find patients to operate upon in civilized society. It was called *Mineral Marmoratum*, and the formula for mixing it as follows.

Take of Anhydrous Phosphoric Acid, 48 grains.

Pure Caustic Lime, 52 grains. Mix rapidly in a mortar.

Having done so, my advice would be, to throw it as rapidly into the dust-bin; it will do less harm there than elsewhere. One of the most common forms of amalgam used at present, originated, I think, a few years ago, with Mr. Evans of Paris, and is composed of pure tin, combined with cadmium and mercury. Now of the last of these three ingredients, it can

be hardly necessary to say anything here. Every one is thoroughly aware of its properties, and being so, one would imagine not now likely to use it, or to submit to having it used to stop his teeth if he was aware of it. To say nothing of the general injury to the system which must ensue from the use of mercury for the purpose of plugging the teeth, it has very frequently the effect of producing salivation. To the teeth themselves it is frighfully destructive, and more active in producing tooth-ache, perhaps, than any other agent known.

The action of the mercury upon other metals is very great. It is a well established fact that in any metallic combination it aids oxydisation. In the mouth, therefore, such compound would be highly objectionable, both as to the disagreeable taste produced, and also the injurious effects upon all the parts and organs adjacent to it, as well as deleterious to the general health. In some constitutions, this will take place more rapidly than in others, but in all it is certain to occur.

There is another, and perhaps more powerful objection which applies not simply to this amalgam but also to almost all others, which is, that being acted upon by the saliva of the mouth, an electric action is engendered which acidifies the saliva, producing thereby a most unpleasant taste, and injuring the teeth to a fearful extent. The action of acid upon the enamel of the teeth has been already spoken of. It destroys the lime—the portion to which this, and the other parts of the teeth owe their hardness. To place, therefore, in the mouth a substance and keep it there, which has the power of generating acid, is a course of procedure to be taken only by a madman.

These latter remarks will apply to almost all the materials used for stopping, being as they are of a metallic character. A list of them need not be given here, their nature being generally known. In fact, so destructive are these agencies upon the teeth, that the Council of Associated Dentists in America have long since determined upon excluding from membership any

practitioner who uses them. In this they were doubtless quite right, and such a course of procedure will tend to uphold the dignity and honour of their body.

A most essential question arises now. These materials should not be used. Granted; what then should? Dentistry has recently undergone most important changes, and been the subject of numerous improvements. Dental Surgery has undergone as great a change as general Surgery, which is certainly saying very much. The old surgery, cruel and horrible it was; but it has passed away. As the author of "Physic and its Phases" has it,

> "If Shakespeare speaks of surgery as an art
> That has no honour in it! trope apart
> The surgery of Shakespeare's day and nation
> Was but another word for mutilation!"

Now, surgery presents an essentially different appearance. It has become conservative, and to a great degree, ceased to be destructive. So with Dentistry; at one time it consisted almost exclusively in extracting teeth. That phase passed away; teeth were stopped, but that was done with injurious materials; these must now be abolished. But still the question is, what will supply their place?

Devoting the greater part of my life to this matter, I tried hundreds of substances, examined them chemically and electrically, tested them by analysis, and tried to combine them by synthesis. The result is, that I am happy to know I have brought to light an agent which will answer every purpose required, both for stopping the teeth and cleaning them, and is perfectly harmless in its effects. This I call the *Liquid Enamel.* I have selected this name because it conveys a very accurate idea of what it really is.

It must appear obvious to the most superficial thinker, that any material to answer the purpose of plugging the teeth per-

fectly, and to be most free from chemical action, should approximate most nearly to the enamel with which Nature has coated these organs. The natural covering of the teeth is like all things else in Nature, the most perfectly adapted for its purpose; all that art can do is to imitate this. I have been guided by that principle. The *Liquid Enamel* resembles, as closely as art can imitate nature, the natural enamel; and from some thousands of applications, and many years' experience, I can say that it will answer the purpose equally well. I have used it in many cases where the teeth were completely stripped of their natural coating, giving rise to the most excruciating pain, and to a decay whose rapidity of progress would soon have destroyed the whole substance of the tooth, and in a short time have made such teeth as sound as ever by recoating them. Nor could any observer detect that such covering was artificial; in truth, the patient himself could not tell, had he not been aware of the application having been made. The tooth becomes as smooth as ivory, all apertures, however small, are filled up, and the most perfect whiteness acquired. In cases where caries has commenced in a front tooth, a small portion of the enamel will fill up the cavity, arrest the decay, and as a matter of course render further pain impossible. In molars, where the cavity is larger, the application is equally easy, and equally effectual. When the tartar has eaten away a portion of the tooth at the neck—a very common circumstance—a little of the *Liquid Enamel* may be applied, and the destroyed part restored.

Wherever the *Liquid Enamel* is used, no further decay can take place, because it renders the teeth impervious to the action of drugs, chemicals, vitiated air, eructations from the stomach, or any other of those agencies which usually prove so destructive to the natural teeth. No tooth-ache can therefore be experienced where it is employed. So simple is it, and so easy of application, that in the majority of cases, any person of ordinary intelligence, can apply it to their own teeth.

The great value of this material will be seen when it is stated that it may be daily used for cleaning the teeth in the place of tooth-powder, and when it is, it effectually prevents decay from occurring.

To compare it with tooth-powders would be absurd, because it has nothing in common with them; but as it really does all, and far more than they are thought to accomplish, and has none of their injurious effects, it should at once be used instead, and they should all be banished to the limbo of disuse, where so many kindred materials also lie buried. That this will occur sooner or later, there can be no doubt whatever. In age, the *Liquid Enamel* is invaluable, as it tends to check effectually that destruction of the teeth, which in the common course of things, may be expected at that time. In youth it should invariably be used, as it tends to prevent pain from those substances so destructive to the teeth, which at that age are so commonly introduced into the mouth. It hardens the gums, and imparts a most delightful fragrance to the breath, and has a most pleasant effect in the mouth.

CHAPTER XII.

ARTIFICIAL TEETH.

" Deep dinted wrinkles in her cheeks she draws,
Sunk are her eyes, and toothless are her jaws."—DRYDEN.

HAD the materials described in the previous chapter been universally employed for the last few years, artificial teeth would be totally unnecessary; the natural organs would in such case occupy the position designed by Nature, and no aid from art in supplying substitutes would be requisite. Such is not the case. There are to be met with, some hundreds of persons whose teeth have become so far decayed as to render extraction desirable, or if they have been left in the mouth, their presence has been of no earthly value. In such cases, the only remedy to resort to, is artifical teeth. In the making of these, very great improvements have recently taken place. If any one will take the trouble to compare those which I supply at the present time, with such as were manufactured a few years ago, nay, are manufactured still by some practitioners of Dentistry, they will be not a little surprised at the contrast. Hard, clumsy, inconvenient in the mouth, next to useless alike for aiding articulation and masticating the food, they were but a very slight improvement upon none. Comfort, convenience, and use, all now combined in the greatest perfection, the loss of the natural teeth is hardly felt. Some very small poet said sarcastically

" The dentist, Sir, makes teeth of bone,
For those whom Fate has left without,
And finds provision for his own
By taking other people's out."

This is hardly a correct description now, either of the dentist or of the teeth he manufactures, at least if he be worthy of the noble profession which he follows.

In the department of dental science, two distinct and somewhat different qualifications are requisite for him who would practice it with credit to himself, and advantage to those who may apply for his assistance.

The first, a thorough knowledge of the anatomy of all the parts concerned—that of the Surgeon. The second, a practical acquaintance with the manufacture of artificial teeth and their various appliances—that of the mechanician. It is but rarely that these can be met with in the same person; hence the imperfections of so many of the teeth manufactured. In many cases, where the teeth are admirably made and beautifully constructed, they not only do not fit, but they are not adapted to the mouth in which they are placed; and are consequently so uncomfortable, that in a very short time the pain occasioned by them is so great, that the wearer is compelled to throw them aside and do without. They are useless for masticating the food, because the slightest pressure upon their upper surface only causes them to give rise to more pain; and they interfere very materially with the powers of articulation, as they allow some of the air to escape when it should not. In other cases, the teeth are made to adjust themselves tolerably well to the form of the mouth, but the materials out of which they are manufactured, and the mode in which they are made, render them unsightly and objectionable.

A most extensive and a most thorough acquaintance with two distinct branches of knowledge, the one an art, and the other a science, can alone remedy this. To accomplish it, is the work of many years and intense labour. I have always striven to combine these two qualifications, and if the testimony of some thousands whom I have supplied with teeth, amongst all classes, from royalty to mechanics, be of any value, then I have suc-

ceeded. In order to turn such knowledge and experience that I may possess to the best account, I never fail to superintend everything myself, done at my establishment.

Although I have at great expense received the services of some of the best artists that I could find in France and Spain, for the mechanical department, still all is done under my own inspection. The surgical part I always perform myself, so that no cause for dissatisfaction can be given.

Dental science has now reached such a degree of perfection, that artificial teeth should answer every purpose both for articulation and mastication equally well with those supplied by nature, if they do not, the fault is in the operator. This is the true test to bring the abilities of any one who supplies them, and I am always anxious that mine should be brought to its standard.

No pain or uneasiness should be caused by wearing them, beyond the slight feeling of awkwardness for the first few days, which arises consequent upon the change in the mouth, and which, after all, is not much greater than happens when a large ring is placed for the first time upon the finger. After this trifling feeling of discomfort is over, no inconvenience whatever is experienced; indeed, it will be found that if they are taken out for any purpose, the wearer experiences the greatest desire to have them returned again into the mouth. This applies only to cases where they have been properly made and adjusted.

Their appearance, too, requires to be studied, as many persons attach great importance to that part of the matter. Very many individuals refrain from wearing artificial teeth, because they think other persons will be able to detect them. This, of itself, is probably a very unsatisfactory reason, since the aid of art is so frequently called in with regard to other parts of the body without compunction. A wig is resorted to when the hair falls off; ladies fly to steel ribs in corsets, to improve their shape, and men sometimes follow their example. Still, teeth should be

made so that any one looking at or speaking to the wearer cannot detect them, and they ought so closely to resemble nature that no one can without a most close inspection tell the difference, and may be so placed in the mouth that detection is impossible. All this should be expected where artificial teeth are resorted to, and should it not be realized, the conclusion ought to be drawn that the dentist was at fault in the practice of his art. When I recommend this judgment to be passed on others, I wish not to exclude myself. If I come not up to my own standard, then blame me. I believe, however, that whatever I have stated to be possible, that I can perform, and do so in all cases when I am consulted.

CHAPTER XIII.

MATERIALS USED IN FIXING ARTIFICIAL TEETH.

"Such is the strength of art, rough things to shape,
And of rude commons, rich enclosures make."—JAMES HOWELL.

In resorting to art for the purpose of supplying the deficiencies caused by the decay of the dental organs, the teeth themselves form but a small portion of the requirements. As they cannot be placed in the sockets on the same principle as their natural predecessors were, some other means will have to be taken to fix them in the mouth. This will render necessary the use of some materials besides those of which the teeth are composed. The principle hitherto adopted, and the one which is still resorted to, to a considerable extent, is that of using metal plates, clasps, &c. This is by no means the best, as will be shown in the next chapter, still where it is employed it is important that it should be rendered as perfect as possible. When one tooth is supplied, it is usually placed upon a small gold plate, and bound with clasps to the adjacent teeth. If a whole set in the upper jaw be required, a large plate is fitted to the alveolar ridge so closely as to be kept in its place by the pressure of the atmosphere. Should the whole of the teeth in both jaws be required, two plates of a similar kind are used, attached to each other by spiral springs.

In all cases, other materials than those which compose the teeth themselves must be used. Gold is generally employed, except in cases where some other metal is used for cheapness.

It is very necessary to avoid any substance that will corrode by the action of the saliva; for this purpose almost every one professes to fix artificial teeth on plates of gold. Now nothing can be more deceptive than all these pretensions regarding this metal. I have known a score of cases where persons have procured a set of artificial teeth, fixed, as they were informed, on a gold plate; shortly afterwards a most disagreeable taste in the mouth, with perhaps a degree of soreness and swelling, told plainly that some chemical action was taking place. Great complaints have been immediately made as to the imposition of substituting something else for gold. I have been consulted as to what course it was best to take. I have been compelled to reply that in all probability the plate was gold after all. The fault is that it is not of a sufficient degree of purity. To call anything gold conveys but a most indefinite idea either of its pecuniary value, or of its use in art, especially in one where so much depends upon its purity as that of dentistry. As all gold is alloyed more or less, or it could not be used, everything will depend on the quantity of the alloy. After giving the subject much consideration, and trying many experiments, I have come to the conclusion that nothing less than eighteen carat gold ought to be used, and in my establishment I never permit it to be so. Then the greatest possible care should be taken that the metals employed are not alloyed with some impurities, whose presence in the mouth will be most disagreeable, and prejudicial to health.

It is a very common occurrence that persons who have spent large sums for artificial teeth, have, after a short time, been compelled to lay them aside, and discontinue using them, from the very unpleasant effect which they produce.

The breath becomes offensive, a most disagreeable taste is experienced in the mouth, the metal plate becomes black and unsightly, and the parts that it comes into contact with covered with sores; if persevered in, the general health suffers. All this is most easily explained; there were some impurities in

the metal, which were acted on chemically by the saliva. The dentist should, therefore, take the greatest possible care to avoid this. In my establishment I make it a rule always to submit every metal that I use to a chemical examination, so as to ascertain its degree of purity, and also to see that no injurious materials are present. The result is, that the gold I employ is perfectly tasteless, and may be worn for a lifetime without either turning black, or producing any disagreeable effects in the mouth. The same remark will apply to every other metal that is allowed a place in my establishment, for none are used but such as, in their pure state, will come up to the standard I have set up.

There are other materials now used in dentistry, besides metals; some of these are extremely valuable, but also requiring great care to be exercised in their use. They are not liable to the same impurities as the metals, but to others of a different character. One of the principal of these substances is gutta percha. Now it is a well known fact that this material in the state in which it is used in commerce, would be wholly unfit to apply in any way to a purpose in which it would have to be introduced into the mouth. Its taste is most disagreeable, its odour by no means pleasant, and its effects upon the system one may easily imagine, not very beneficial. Before it can be used, therefore, it has to undergo a peculiar preparation. In order that this shall be accomplished satisfactorily, I have it done under my own superintendence in my establishment.

There is, perhaps, hardly any profession in which so much care of this kind is required as that of a surgeon-dentist. Even with a medical man it is less important; a dose of medicine taken once, even should it contain a larger or smaller quantity of some of its ingredients than is proper, or the presence of something that ought not to have been there, produces in most cases but a slight disorder, which in an hour or two is over.

In this case, an injurious substance is kept constantly in the mouth from morning to night, day after day, and as a matter of course, the whole constitution undermined. No care, therefore, can be too scrupulous and no skill too great. Happily, chemistry comes to our assistance, and if we do but know how to apply it, will not let us go far wrong. It is as essential to the dental art, as is a knowledge of the anatomy and physiology of the teeth. Every dental practitioner should therefore be a good chemist, and always willing to take the trouble that the application of the science to his profession would impose upon him.

CHAPTER XIV.

THE VULCANITE BASE.

"What cannot art and industry perform,
When science plans the progress of their toil."—BEATTIE.

PERHAPS the greatest discovery ever made in connection with the science and art of dentistry, is the invention of what is now called the vulcanite base. It gets rid of, at once and for ever, all wire springs, clasps, and other metallic fastenings, which are not only unsightly, but, if the greatest possible care be not taken, are calculated to injure the teeth. It is used for the purpose of mounting teeth instead of a gold plate, to which it is infinitely superior; its advantages are several.

It is of the natural colour of the mouth. It has been already stated that many persons object to use artificial teeth on the ground that they will be detected by others; with the vulcanite base the objection will not hold good. Any one looking closely into the mouth of another, whose teeth have been fixed upon it, cannot discover that he is not gazing upon the natural organs. If the old adage, "ars est cœlare artem" be of any value, then the vulcanite base may be said to be the perfection of art, for so closely does it resemble nature, that no art can be detected.

It is soft and elastic; this is a quality which needs not to be enlarged upon; every one will perceive at once that a soft, elastic substance in the mouth must be very much more agreeable than one of the hardness of a metallic plate. If comfort be desirable, then is the vulcanite base a great discovery. So easily does it sit upon the parts to which it is fixed, that one might

almost wear it without knowing that it was present, were they not cognisant of the fact of its having been placed there. It moulds itself to the form of the mouth, so that no uneven elevations or depressions can possibly be present, and no openings remain for the lodgement of a particle of food, nor even the admission of air between it and the roof of the mouth. It adapts itself as closely to the mouth as a kid glove does to the hand. Had it no other quality than this, it would indeed be a great discovery and a great boon to those who are compelled to have recourse to artificial teeth.

It is lighter than any other material ever employed. Now, although where a gold plate is used, its thickness is not sufficiently great as to render it very burdensome from its weight, yet all will admit that it is desirable to have any article which is supported upon such delicate parts as the interior of the mouth, composed of materials as light as possible. In this respect, perfection is surely reached in the vulcanite base.

It resists the action of heat, acids, &c. In this it is most unquestionably superior to a metal plate, however pure the gold may be of which it is made, but when compared with so many that are manufactured of impure materials, its real worth can scarcely be conceived.

Acids, so destructive even to the natural teeth, have no effect upon it, either of a chemical or an electric character; heat leaves it unchanged; drugs of every kind it will resist the action of; vitiated air escaping from the lungs, or gases from the stomach, are alike powerless to affect it. In truth, any agency likely to operate on it from the position which it occupies, will be unable to produce the slightest effect upon it.

Its durability is extraordinary; as a matter of course, it will almost follow as a necessary consequence that any substance so impervious to chemical influence as this, will not very readily wear out. The Vulcanite Base will last a person's life-time

easily. A set of teeth once fixed upon it in the mouth, no more trouble need be taken about them.

An invention of a similar character to the Vulcanite Base was declared to have been made some five years since, and was announced under the name of Trueman's Patent. It proved, however, a complete failure. The difficulties in the way of accomplishing everything I have stated, were so great, that a score of failures were inevitable before success would be accomplished. At last, however, the much talked of and long desired goal has been reached, and success achieved, in the material under consideration.

The Vulcanitè Base being an invention of my own, can be manufactured perfectly only at my establishment. I have had large and extensive apparatus fitted up for its manufacture, the process of which I always superintend myself, and it may therefore be relied on that all used by me is free from impurities of any kind. I have recommended the Vulcanite Base rather warmly; it is, however, because I believe it to be very far superior for the purpose for which it is employed, than anything else at present manufactured.

THE END.

MR. EDWARD DAVIESON'S hours for Consultation are from ten till six.

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